

Advanced AFV Topics

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Understanding Emissions

**Ozone, NO_x, CO
CO₂, VOCs, PM**

Smoke, fumes, odors...





Volatile Organic Compounds

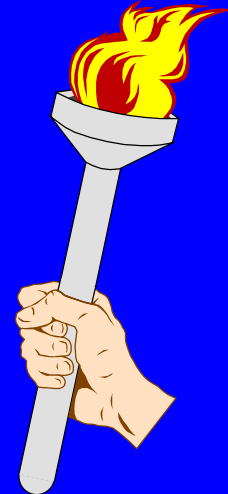
- ✓ **Unburned Hydrocarbons**
- ✓ **Paints & Thinners**
- ✓ **Some Industrial By-products**
- ✓ **Natural Organic Respiration**



Nitrous Oxides

Products of Combustion

- ✓ **DIESEL engines**
- ✓ **Motor Vehicle Exhaust**
- ✓ **Industrial boilers/turbines/furnaces**
- ✓ **Airplanes & Locomotives**
- ✓ **small engines, charcoal, fireplaces**





URBAN FOLIAGE

Other Common Emissions

CO - carbon monoxide

CO₂ - carbon dioxide

PM - particulate matter

*Smoke, fumes, odors are virtually
eliminated with many AFVs*



HD Diesel Consent Decree

(October 1998)

- **Caterpillar, Cummins, Detroit Diesel, Mack Trucks, Navistar, Renault, and Volvo Trucks named in suit by EPA and Department of Justice for installing illegal “defeat devices” on engines that result in excess emissions...**
- **(1.3 million engines) affected**



HD Diesel Consent Decree

(October 1998)

- **3 times the allowable NO_x emissions**
- **1.3 million tons of excess NO_x in 98 alone**
- **equivalent to an additional 65 million cars on the road or 6% of the total NO_x emissions across the nation**



HD Diesel Consent Decree

- **\$ 83.4 million in penalties**
- **> \$ Billion to be spent on resolution**
- **Most appear to have chosen diesel technology projects**
- **Detroit Diesel - CNG Bus Projects**
 - **\$300,000 to Allegheny County (PA)**
 - **\$300,000 to MARTA (Atlanta)**



Consent Decree (cont.)

- **VOLVO - \$ 4 million for CNG engine development and demo program**
- **Cummins - \$ 4.4 million for CNG engine development and demos**

(both to be completed within 6 years)



Separating Myth from Fact ...

Myths

can result from:

- Mis-Information
- Partial Information
- Selective Data Screening
- Anecdotal Stories
- Enthusiastic Salespeople

Emissions



Myth

CNG buses have “higher”
CO emissions and “may”
produce more ultra-fine
particulate emissions.

Emissions



Fact

Some diesel engines have demonstrated lower CO emissions than CNG buses, but Both Diesel and CNG buses have very low CO emissions (1/10 to 1/20 of the national standard). Also, no testing method for ultra-fine PM has been accepted yet.

Handling AFV Challengers

- **Sound bites on AFVs are often oversimplified and may be misleading - dig in and study the details!**
- **Study the facts, Not the Headlines.**
- **Fuel cost can make a BIG difference in AFV studies. Make sure your analysis reflects current market conditions and up-to-date fuel prices.**